

Applicant : Jannis Moutsokapas
For : OPTICAL DEVICE FOR THE AUTOMATIC
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The listing of the claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Please amend claims 1-18.

Please add new claims 19-64.

1. (Currently Amended) Method for load transfer in a container storage space for standard containers, with a stacker crane for the containers servicing the container storage space, controllable by a logistical management data processing DP (DP) system of a logistical management, which, wherein the stacker crane can travel between a storage place for each container and a loading platform of a transport vehicle of a container that can travel in the area of the container storage space, wherein the stacker crane has a load suspension device for depositing the container on the loading platform, which can be oriented with respect to it, characterized by the sequence of the following work steps when the method of loading the transport vehicle comprising:
 - a) identifying the transport vehicle is identified and transferring the data generated in this way are transmitted to the logistical management DP system of a logistical management,
 - b) by means of providing a calibrated camera system, detecting defined identification points are detected on the loading platform of the transport vehicle with said camera system and their transferring coordinates are transmitted of the identification points to the logistical management DP system,
 - c) comparing with the logistical management DP system compares the coordinates of the identification points against the data of the container being loaded as stored in the DP system and determines the fastening means determining the fastener to be assigned to this container and position coordinates on the loading platform of the transport vehicle,

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- d) driving the stacker crane ~~drives~~ under computer control with the container to be loaded above the loading platform of the transport vehicle, ~~exactly congruent and above the~~ position coordinate, ~~while~~ wherein the position coordinate is ~~described~~ defined by the vertical position of the loading platform and by the point of intersection of the diagonals of the identification points of the loading platform, ~~which~~ wherein the position coordinate describes the ~~absolute~~ target position of the container,
- e) ~~by means of~~ providing a calibrated camera system arranged on the trolley of the stacker crane, detecting the fastening means fastener of the loading platform are ~~detected and~~ selectively moving the container is ~~moved if necessary so that the fastening means fastener~~ of the container ~~stand congruently~~ is positioned above the coordinated fastening ~~means fastener~~ of the loading platform,
- f) setting down the container is ~~set down~~ on the loading platform of the transport vehicle such that the fastening means fastener of the container and the coordinated fastening means fastener of the loading platform mate together at the end of the setdown process.
2. (Currently Amended) Method for load transfer in a container storage space for standard containers, with a stacker crane for the containers servicing the container storage space, controllable by a logistical management data processing DP(DP) system ~~of a logistical management, which, wherein the stacker crane~~ can travel between a storage place for each container and a loading platform of a transport vehicle of a container that can travel in the area of the container storage space, wherein the stacker crane has a load suspension device for picking the container up from the loading platform, which can be oriented with respect to it, ~~characterized by the sequence of the following work steps in the method of~~ unloading of a transport vehicle comprising:

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- a) ~~identifying~~ the transport vehicle and the container being unloaded ~~are identified and~~
~~transferring~~ the data generated in this way ~~are transmitted to the~~ logistical management
DP system of a logistical management,
- b) ~~by means of providing~~ a calibrated camera system, detecting defined identification points
of the container ~~are detected with said camera system and their~~ transferring coordinates are
~~transmitted of the identification points~~ to the logistical management DP system,
- c) determining with the logistical management DP system ~~determines~~, from the
identification points, the ~~fastening means~~ fastener and position coordinate of the container,
- d) driving the stacker crane ~~drives under computer control above the container, exactly~~
~~congruent and above the position coordinate~~, while the position coordinate is described by
the vertical position of the upper edge of the identification points of the container and by
the point of intersection of the diagonals of the identification points of the container,
which describes the absolute target position of the load suspension device,
- e) ~~by means of providing~~ a calibrated camera system arranged on the trolley of the stacker
crane, detecting the ~~fastening means~~ fastener of the loading platform of the container ~~are~~
~~detected and selectively moving~~ the load suspension device ~~is moved if necessary so that~~
the ~~fastening means~~ fastener of the load suspension device of the stacker crane ~~standstands~~
~~congruently above the coordinated fastening means~~ fastener of the container,
- f) bringing the load suspension means ~~is brought up to the container such that the~~ ~~fastening~~
~~means~~ fastener of the load suspension means and the ~~fastening means~~ fastener of the
container mate together.

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3. (Currently Amended) Method ~~per~~according to claim 1 or 2, ~~characterized in that~~wherein the transport vehicle or the container being unloaded is identified by means of a camera system.
4. (Currently Amended) Method according to ~~one of claims 1 to~~claim 3, ~~characterized in that, in order to detect~~wherein said detecting the coordinates of the identification points of the loading platform or the identification points of the container, ~~an operator, supported by comprises providing~~ a user-defined interface on a monitor screen of the logistical management DP system, ~~uses a marking mechanism to select~~and selecting by an operator of the identification points of the loading platform or the identification points of the container with a marking mechanism on the user-defined interface.
5. (Currently Amended) Method according to ~~one of claims 1 to~~claim 4, ~~characterized in that~~including automatically detecting the coordinates of the identification points of the loading platform or the identification points of the container ~~are automatically detected by~~ a computer system and ~~transmitted~~transferring the coordinates to the logistical management DP system.
6. (Currently Amended) Method according to ~~one of claims 1 to~~claim 5, ~~characterized in that~~the detectionwherein said automatically detecting of the coordinates of the loading platform of the transport vehicle occurs in its loading and unloading zone and that of the coordinates of the loading platform of the container occurs in its loading and unloading zone.
7. (Currently Amended) Method according to ~~one of claims 1 to~~claim 6, ~~characterized in that~~the detectionwherein the automatically detecting of the coordinates of the loading platform of the transport vehicle or the coordinates of the container occurs in the identification zone.

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8. (Currently Amended) Method according to ~~one of claims 1 to claim~~ claim 7, characterized in ~~that wherein~~ the vertical position of the loading platform and the point of intersection of the diagonals of the identification points of the loading platform or the vertical position of the upper edge of the identification points of the container and the point of intersection of the diagonals of the identification points of the container describe the relative target position of the container.
9. (Currently Amended) Method according to ~~one of claims 1 to claim~~ claim 8, characterized in ~~that wherein~~ the position coordinate is described by the absolute target position of the container or of the load suspension device, which is composed of the coordinates of the transport vehicle located in the parking position as detected by means of a camera and the relative target position of the container or of the load suspension device.
10. (Currently Amended) Method according to ~~one of claims 1 to claim~~ claim 9, characterized in ~~that including moving~~ the stacker crane is moved into reach of the loading platform or of the container in such a way that the point of intersection of the diagonals of the ~~fastening means~~ fastener of the container or the load suspension device stands ~~eongruently~~ congruently plumb above the point of intersection of the diagonals of the ~~fastening means~~ fastener of the loading platform or the container.
11. (Currently Amended) Method according to ~~one of claims 1 to claim~~ claim 10, characterized in ~~that including providing~~ a second user-defined interface, ~~has said second user defined interface having~~ four quadrants, each representing a pair of ~~fastening means~~ fasteners, and each pair consists of one ~~fastening means~~ fastener of the loading platform or of the container, projected by an image of the camera system, and of the coordinated ~~fastening means~~ fastener of the container or the load suspension device, projected by a superimposing of a computer-calculated contour of the container or of the load suspension means and of the ~~fastening means~~ fastener of the container or of the load suspension means onto the image.

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12. (Currently Amended) Method according to ~~one of claims 1 to~~claim 11, characterized in ~~that~~including determining any deviation in position of the container being loaded from the position of the loading platform or the position of the load suspension device from the position of the container being unloaded ~~can be determined~~ in the logistical management DP system for a fine-tuned positioning, ~~in that~~by providing the second user-defined interface of logistical management ~~has with~~ a second marking mechanism, ~~with which~~wherein the operator selects at least one identification point of the loading platform or of the container with said second marking mechanism.

13. (Currently Amended) Method according to ~~one of claims 1 to~~claim 12, characterized in ~~that~~including providing a fine positioning computer system and automatically recognizing any deviation in position of the container being loaded from the position of the loading platform or in the position of the load suspension device from the position of the container being unloaded ~~is automatically recognized by a~~with said fine positioning computer system ~~for the fine positioning~~.

14. (Currently Amended) Method according to ~~one of claims 1 to~~claim 13, characterized in ~~that, if there is any~~wherein a deviation in position of the container being loaded from the position of the loading platform of the container or in the position of the load suspension device from the container being unloaded, the load suspension device is rotated so that the ~~fastening means~~fastener of the container ~~stand congruently~~stands plumb above the ~~fastening means~~fastener of the loading platform, or the ~~fastening means~~fastener of the load suspension device ~~stand congruently~~stands plumb above the ~~fastening means~~fastener of the container.

15. (Currently Amended) Method according to ~~one of claims 1 to~~claim 14, characterized in ~~that the~~including setting down and releasing of the container from the load suspension

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device or the setting down of the load suspension device of the stacker crane onto the container is ~~guided~~ by the operator until the ~~fastening means~~ fasteners mate with each other.

16. (Currently Amended) Method ~~for~~ according to claim 15, including adjusting the position of a stacker crane in a container storage space, ~~to implement the method according to one or more of claims 1 or 2, as well as 3 to 15, with said~~ adjusting the position comprising providing a camera system having at least one calibrated camera fastened on the trolley of the stacker crane for detection of the position of containers being handled, with an absolute length measuring system to detect the position of the stacker crane, characterized by the sequence of the following work steps, making use of precalibrated cameras:

- a) ~~positioning~~ the stacker crane travels above a reference point arranged at any given position within the container yard, so that said at least one calibrated camera of the camera system detects the reference point, and
- b) ~~the logistical management DP system compares~~ comparing the position of the reference point with the memorized position of the reference point with the logical management DP system and determines determining an offset when ~~any~~ a deviation exists.

17. (Currently Amended) Method ~~per~~ according to claim 16, characterized in that the container yard has several reference points, which can be detected by the cameras of the stacker crane.

18. (Currently Amended) Method according to claim 15 for adjusting the position of ~~at the at~~ at least one calibrated camera, which is arranged on ~~at the~~ the stacker crane, ~~which is located in a container yard, for implementing the method according to one or more of claims 1 or 2, as well as 3 to 15, with a camera system fastened to the stacker crane for detecting the position of containers being handled, with~~ including defining an absolute length

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measuring system for detecting the position of the stacker crane, characterized in that the container yard has a super-reference point and asaid at least one calibrated camera is arranged on the stacker crane that can be adjusted relative to it by means of the super-reference point.

19. (New) Method according to claim 1, wherein the transport vehicle or the container being unloaded is identified by means of a camera system.
20. (New) Method according to claim 19, wherein said detecting the coordinates of the identification points of the loading platform or the identification points of the container comprises providing a user-defined interface on a monitor screen of the logistical management DP system, and selecting by an operator of the identification points of the loading platform or the identification points of the container with a marking mechanism on the user-defined interface.
21. (New) Method according to claim 20, including automatically detecting the coordinates of the identification points of the loading platform or the identification points of the container by a computer system and transferring the coordinates to the logistical management DP system.
22. (New) Method according to claim 21, wherein said automatically detecting of the coordinates of the loading platform of the transport vehicle occurs in its loading and unloading zone and that of the coordinates of the loading platform of the container occurs in its loading and unloading zone.
23. (New) Method according to claim 22, wherein the automatically detecting of the coordinates of the loading platform of the transport vehicle or the coordinates of the container occurs in the identification zone.

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24. (New) Method according to claim 23, wherein the vertical position of the loading platform and the point of intersection of the diagonals of the identification points of the loading platform or the vertical position of the upper edge of the identification points of the container and the point of intersection of the diagonals of the identification points of the container describe the relative target position of the container.
25. (New) Method according to claim 24, wherein the position coordinate is described by the absolute target position of the container or of the load suspension device, which is composed of the coordinates of the transport vehicle located in the parking position as detected by means of a camera and the relative target position of the container or of the load suspension device.
26. (New) Method according to claim 25, including moving the stacker crane into reach of the loading platform or of the container in such a way that the point of intersection of the diagonals of the fastener of the container or the load suspension device stands plumb above the point of intersection of the diagonals of the fastener of the loading platform or the container.
27. (New) Method according to claim 26, including providing a second user-defined interface, said second user defined interface having four quadrants, each representing a pair of fasteners, and each pair consists of one fastener of the loading platform or of the container, projected by an image of the camera system, and of the coordinated fastener of the container or the load suspension device, projected by a superimposing of a computer-calculated contour of the container or of the load suspension means and of the fastener of the container or of the load suspension means onto the image.
28. (New) Method according to claim 27, including determining any deviation in position of the container being loaded from the position of the loading platform or the position of the

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load suspension device from the position of the container being unloaded in the logistical management DP system for a fine-tuned positioning, by providing the second user-defined interface of logistical management with a second marking mechanism, wherein the operator selects at least one identification point of the loading platform or of the container with said second marking mechanism.

29. (New) Method according to claim 28, including providing a fine positioning computer system and automatically recognizing any deviation in position of the container being loaded from the position of the loading platform or in the position of the load suspension device from the position of the container being unloaded with said fine positioning computer system.
30. (New) Method according to claim 29, wherein a deviation in position of the container being loaded from the position of the loading platform of the container or in the position of the load suspension device from the container being unloaded, the load suspension device is rotated so that the fastener of the container stands plumb above the fastener of the loading platform, or the fastener of the load suspension device stands plumb above the fastener of the container.
31. (New) Method according to claim 30, including setting down and releasing of the container from the load suspension device or the setting down of the load suspension device of the stacker crane onto the container by the operator until the fasteners mate with each other.
32. (New) Method according to claim 31, including adjusting the position of a stacker crane in a container storage space, said adjusting the position comprising providing a camera system having at least one calibrated camera fastened on the trolley of the stacker crane for detection of the position of containers being handled, with an absolute length measuring system to detect the position of the stacker crane, positioning the stacker crane

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travels above a reference point arranged at any given position within the container yard, so that said at least one calibrated camera of the camera system detects the reference point, and comparing the position of the reference point with the memorized position of the reference point with the logical management DP system and determining an offset when a deviation exists.

33. (New) Method according to claim 32, characterized in that the container yard has several reference points, which can be detected by the cameras of the stacker crane.
34. (New) Method according to claim 33 for adjusting the position of the at least one calibrated camera, which is arranged on the stacker crane including defining an absolute length measuring system for detecting the position of the stacker crane, characterized in that the container yard has a super-reference point and said at least one calibrated camera is arranged on the stacker crane that can be adjusted relative to it by means of the super-reference point.
35. (New) Method according to claim 1, wherein said detecting the coordinates of the identification points of the loading platform or the identification points of the container comprises providing a user-defined interface on a monitor screen of the logistical management DP system, and selecting by an operator of the identification points of the loading platform or the identification points of the container with a marking mechanism on the user-defined interface.
36. (New) Method according to claim 1, including automatically detecting the coordinates of the identification points of the loading platform or the identification points of the container by a computer system and transferring the coordinates to the logistical management DP system.

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37. (New) Method according to claim 1, wherein said automatically detecting of the coordinates of the loading platform of the transport vehicle occurs in its loading and unloading zone and that of the coordinates of the loading platform of the container occurs in its loading and unloading zone.
38. (New) Method according to claim 1, wherein the automatically detecting of the coordinates of the loading platform of the transport vehicle or the coordinates of the container occurs in the identification zone.
39. (New) Method according to claim 1, wherein the vertical position of the loading platform and the point of intersection of the diagonals of the identification points of the loading platform or the vertical position of the upper edge of the identification points of the container and the point of intersection of the diagonals of the identification points of the container describe the relative target position of the container.
40. (New) Method according to claim 1, wherein the position coordinate is described by the absolute target position of the container or of the load suspension device, which is composed of the coordinates of the transport vehicle located in the parking position as detected by means of a camera and the relative target position of the container or of the load suspension device.
41. (New) Method according to claim 1, including moving the stacker crane into reach of the loading platform or of the container in such a way that the point of intersection of the diagonals of the fastener of the container or the load suspension device stands plumb above the point of intersection of the diagonals of the fastener of the loading platform or the container.
42. (New) Method according to claim 1, including providing a second user-defined interface, said second user defined interface having four quadrants, each representing a pair of

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fasteners, and each pair consists of one fastener of the loading platform or of the container, projected by an image of the camera system, and of the coordinated fastener of the container or the load suspension device, projected by a superimposing of a computer-calculated contour of the container or of the load suspension means and of the fastener of the container or of the load suspension means onto the image.

43. (New) Method according to claim 1, including determining any deviation in position of the container being loaded from the position of the loading platform or the position of the load suspension device from the position of the container being unloaded in the logistical management DP system for a fine-tuned positioning, by providing the second user-defined interface of logistical management with a second marking mechanism, wherein the operator selects at least one identification point of the loading platform or of the container with said second marking mechanism.
44. (New) Method according to claim 1, including providing a fine positioning computer system and automatically recognizing any deviation in position of the container being loaded from the position of the loading platform or in the position of the load suspension device from the position of the container being unloaded with said fine positioning computer system.
45. (New) Method according to claim 1, wherein a deviation in position of the container being loaded from the position of the loading platform of the container or in the position of the load suspension device from the container being unloaded, the load suspension device is rotated so that the fastener of the container stands plumb above the fastener of the loading platform, or the fastener of the load suspension device stands plumb above the fastener of the container.

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46. (New) Method according to claim 1, including setting down and releasing of the container from the load suspension device or the setting down of the load suspension device of the stacker crane onto the container by the operator until the fasteners mate with each other.
47. (New) Method according to claim 1, including adjusting the position of a stacker crane in a container storage space, said adjusting the position comprising providing a camera system having at least one calibrated camera fastened on the trolley of the stacker crane for detection of the position of containers being handled, with an absolute length measuring system to detect the position of the stacker crane, positioning the stacker crane travels above a reference point arranged at any given position within the container yard, so that said at least one calibrated camera of the camera system detects the reference point, and comparing the position of the reference point with the memorized position of the reference point with the logical management DP system and determining an offset when a deviation exists.
48. (New) Method according to claim 47, characterized in that the container yard has several reference points, which can be detected by the cameras of the stacker crane.
49. (New) Method according to claim 1 for adjusting the position of the at least one calibrated camera, which is arranged on the stacker crane including defining an absolute length measuring system for detecting the position of the stacker crane, characterized in that the container yard has a super-reference point and said at least one calibrated camera is arranged on the stacker crane that can be adjusted relative to it by means of the super-reference point.
50. (New) Method according to claim 2, wherein said detecting the coordinates of the identification points of the loading platform or the identification points of the container comprises providing a user-defined interface on a monitor screen of the logistical management DP system, and selecting by an operator of the identification points of the

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loading platform or the identification points of the container with a marking mechanism on the user-defined interface.

51. (New) Method according to claim 2, including automatically detecting the coordinates of the identification points of the loading platform or the identification points of the container by a computer system and transferring the coordinates to the logistical management DP system.
52. (New) Method according to claim 2, wherein said automatically detecting of the coordinates of the loading platform of the transport vehicle occurs in its loading and unloading zone and that of the coordinates of the loading platform of the container occurs in its loading and unloading zone.
53. (New) Method according to claim 2, wherein the automatically detecting of the coordinates of the loading platform of the transport vehicle or the coordinates of the container occurs in the identification zone.
54. (New) Method according to claim 2, wherein the vertical position of the loading platform and the point of intersection of the diagonals of the identification points of the loading platform or the vertical position of the upper edge of the identification points of the container and the point of intersection of the diagonals of the identification points of the container describe the relative target position of the container.
55. (New) Method according to claim 2, wherein the position coordinate is described by the absolute target position of the container or of the load suspension device, which is composed of the coordinates of the transport vehicle located in the parking position as detected by means of a camera and the relative target position of the container or of the load suspension device.

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56. (New) Method according to claim 2, including moving the stacker crane into reach of the loading platform or of the container in such a way that the point of intersection of the diagonals of the fastener of the container or the load suspension device stands plumb above the point of intersection of the diagonals of the fastener of the loading platform or the container.

57. (New) Method according to claim 2, including providing a second user-defined interface, said second user defined interface having four quadrants, each representing a pair of fasteners, and each pair consists of one fastener of the loading platform or of the container, projected by an image of the camera system, and of the coordinated fastener of the container or the load suspension device, projected by a superimposing of a computer-calculated contour of the container or of the load suspension means and of the fastener of the container or of the load suspension means onto the image.

58. (New) Method according to claim 2, including determining any deviation in position of the container being loaded from the position of the loading platform or the position of the load suspension device from the position of the container being unloaded in the logistical management DP system for a fine-tuned positioning, by providing the second user-defined interface of logistical management with a second marking mechanism, wherein the operator selects at least one identification point of the loading platform or of the container with said second marking mechanism.

59. (New) Method according to claim 2, including providing a fine positioning computer system and automatically recognizing any deviation in position of the container being loaded from the position of the loading platform or in the position of the load suspension device from the position of the container being unloaded with said fine positioning computer system.

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60. (New) Method according to claim 2, wherein a deviation in position of the container being loaded from the position of the loading platform of the container or in the position of the load suspension device from the container being unloaded, the load suspension device is rotated so that the fastener of the container stands plumb above the fastener of the loading platform, or the fastener of the load suspension device stands plumb above the fastener of the container.
61. (New) Method according to claim 2, including setting down and releasing of the container from the load suspension device or the setting down of the load suspension device of the stacker crane onto the container by the operator until the fasteners mate with each other.
62. (New) Method according to claim 2, including adjusting the position of a stacker crane in a container storage space, said adjusting the position comprising providing a camera system having at least one calibrated camera fastened on the trolley of the stacker crane for detection of the position of containers being handled, with an absolute length measuring system to detect the position of the stacker crane, positioning the stacker crane travels above a reference point arranged at any given position within the container yard, so that said at least one calibrated camera of the camera system detects the reference point, and comparing the position of the reference point with the memorized position of the reference point with the logical management DP system and determining an offset when a deviation exists.
63. (New) Method according to claim 62, characterized in that the container yard has several reference points, which can be detected by the cameras of the stacker crane.
64. (New) Method according to claim 2 for adjusting the position of the at least one calibrated camera, which is arranged on the stacker crane including defining an absolute length measuring system for detecting the position of the stacker crane, characterized in that the container yard has a super-reference point and said at least one calibrated camera is

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arranged on the stacker crane that can be adjusted relative to it by means of the super-reference point.